Model 2004

Description

Model 2004 is a Rapid Exchange® purging system that operates on a supply of compressed instrument air or inert gas. It regulates and monitors pressure within sealed (protected) enclosure(s), in order to remove and prevent flammable gas or vapor accumulations. The system accomplishes four air exchanges and maintains a "safe" (0.25") pressure. A Pepperl+Fuchs Model EPV-4 Enclosure Protection Vent is required for proper operation. In addition, the system includes an electrical power control unit (EPCU) that monitors system operation and controls enclosure power. All start-up requirements must be satisfied before the EPCU will energize power to the enclosure(s). This process reduces the hazardous (classified) area rating within the enclosure(s), in accordance with the NEC - NFPA 70, Article 500, NFPA 496 and ISA 12.4.

Basic Operation

In accordance with system instructions, start-up requires the air supply to be engaged and EPCU power to be energized. The enclosure protection vent must be tested and the enclosure(s) must be sealed. The EPCU power control switch must be activated and the system will self-test. The enclosure pressure control valve is used to manually set a safe reading on the enclosure pressure indicator. When safe pressure is stable, the Rapid Exchange® control valve is fully engaged by manual or automatic means (dependent on System Style, see below). Upon completion of the Rapid Exchange® cycle, (five minutes minimum) the Rapid Exchange® control valve disengages manually or automatically. Pressure returns to the safe setting and enclosure power is energized by the EPCU. Loss of safe pressure causes the EPCU to deenergize power to the protected enclosure(s). All systems include form "C" contacts for audible or visual alarm systems.

STD Style (Standard)

FA/SA Style (Fully Automatic/Semiautomatic)

Style Variances

STD (Standard) Style systems require manual operation of the Rapid Exchange® control valve.

SA (Semiautomatic) Style systems require manual engagement of the Rapid Exchange® control valve to initiate the exchange cycle, but automatically disengages the valve upon completion of the cycle. Loss of safe pressure requires an operator to manually restart both systems above

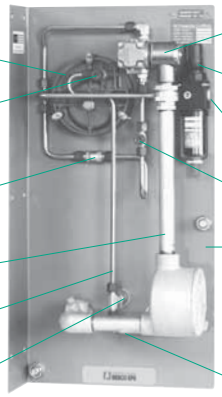
FA (Fully Automatic) Style systems engage and disengage the Rapid Exchange® control valve automatically, after an operator manually sets a safe pressure. In addition, FA Style systems restart automatically after a power or air pressure failure.

Standard Model Applications

Model Number:	**2004 Type X**
Designation:	Purging System
Enclosure Volume:	200 ft³ max.
STD (Standard) Style	
UL & FM Certified:	Cl. I, Div. 1, Group C&D*
Rating Reduction:	Div. 1 to Unclassified

SA (Semiautomatic) Style		FA (Fully Automatic) Style	
UL & FM Certified:	Cl. I, Div. 1, Group C&D	UL & FM Certified:	Cl. I, Div. 1, Group C&D
Rating Reduction:	Div. 1 to Unclassified	Rating Reduction:	Div. 1 to Unclassified

***FM Certified Group B System Available in STD Style**



STD Style

SA & FA Style (with Rapid Exchange® Solenoid Valve)

CONNECTION POINTS SHOWN ABOVE IN BOLD TEXT ON SYSTEM DIAGRAM

Material Specifications

Filter Regulator Body:	Zinc w/Enamel Finish
Regulator Handle & Bowl:	Polycarbonate
Enclosure Pressure Gauge:	Alum. w/Enamel Finish
Rapid Exchange Gauge:	Poly Case & Brass Tube
Rapid Exchange Solenoid:	Brass w/Enamel Finish
Tube Fittings & Valves:	316 SS Forged Body
Tubing:	316 SS 1/4" & 3/8" .035 Welded
System Nameplates:	Silkscreened Lexan® & SS
Fastener Hardware:	Alum. & Stainless Steel
Mounting Plate:	316 14 Ga #3 Brush SS
EPCU Enclosure Body:	Bead Blast Cast Alum.
Conduit & Fittings (SA & FA):	Galvanized Steel
Enclosure Warning Nameplate:	Silkscreened SS

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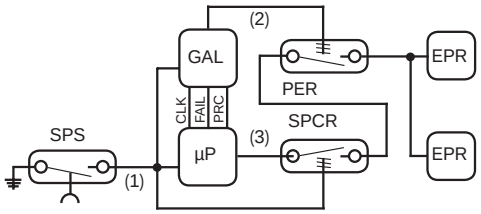
Simplified EPCU Redundant Logic Diagram

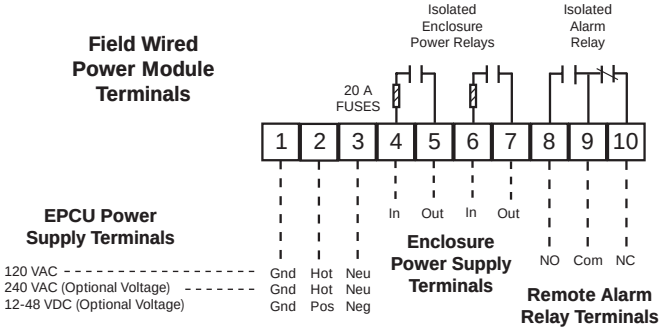
OPERATION

Signal (1) from SPS is sent to µP, GAL and SPCR coil. During start-up, GAL verifies all µP functions. GAL & µP must receive uninterrupted signal from SPS to prevent logic resetting. After GAL verifies all start-up procedures, it sends "power enabled" Signal (2) to PER coil. Then, µP sends "power request" Signal (3) through the SPCR and PER contacts to EPR coils.



SPS - SAFE PRESSURE SWITCH
GAL - GATE ARRAY LOGIC
µP - MICROPROCESSOR
PER - POWER ENABLED RELAY
SPCR - SAFE PRESSURE CONFIRMATION RELAY
EPR - ENCLOSURE POWER RELAY

Electrical Wiring Diagram



System Specifications

System Dimensions:	See Page 70
Shipping Weight:	STD - 45 lb / SA & FA - 47 lb
Temp. Range:	-20°F to +120°F
Supply Pressure Range:	80 - 120 psi max.
Capacity & Filtration:	3.8 oz @ 40 Microns
Supply Requirements:	Clean air or inert gas
Safe Press. Setpoint:	0.25" @ Safe Press.
Safe Press. Flowrate:	* 0.1 - 3.5 SCFH
Exchange Pressure:	3" - 5"
Exchange Flowrate:	** 10 SCFM/600 SCFH
Exchange Time:	1 Minute/2.5 ft^3
System Supply Port:	3/8" FPT
Enclosure Supply Fitting:	3/8" Tube Fitting
Enclosure Reference Fitting:	1/4" Tube Fitting
EPCU Conduit Port Size:	1/2" FPT
EPCU Power Requirements:	120 VAC 60 Hz 1Ø
(European 220 voltage only)	240 VAC 50 Hz 1Ø
(All voltage ratings are factory set)	*** 12-48 VDC
EPCU Power Consumption:	500 mA
Power Relay Contacts:	20 A @ 240 VAC
	20 A @ 28 VDC
	*** 20 A @ 48 VDC
Alarm Relay N.O. Contact:	20 A @ 240 VAC
	20 A @ 28 VDC
Alarm Relay N.C. Contact:	15 A @ 240 VAC
	10 A @ 28 VDC

* Enclosure integrity determines actual flow rate

** With regulator set to 80 psi min. during exchange

*** Optional 12-48 VDC Power Module Specifications

EPCU Description

The Pepperl+Fuchs 2000 Series EPCU is a factory programmed, field adjustable, microprocessor controlled unit featuring full status indication, redundant gate array logic and electromechanical relays. The EPCU is constructed from four major items: (1) a power module, (2) a pressure switch module, (3) a logic module and (4) a power mode selector switch. The sections are linked with polarized cable, and the boards are stacked in the EPCU enclosure on standoffs.

Basic EPCU Operation

When power is "off", the EPCU is at rest, alarm and power relays are deenergized, and the LED display is off. When power is switched "on", the EPCU performs a self-test of LED display and logic functions. The unit will then start-up. Class I units must detect a 0.25" pressure to energize the alarm relay and begin an exchange cycle. When the cycle stops, the power relays will energize. Loss of safe pressure on either unit causes alarm and power relays to deenergize (see power control options for more information regarding EPCU operation).

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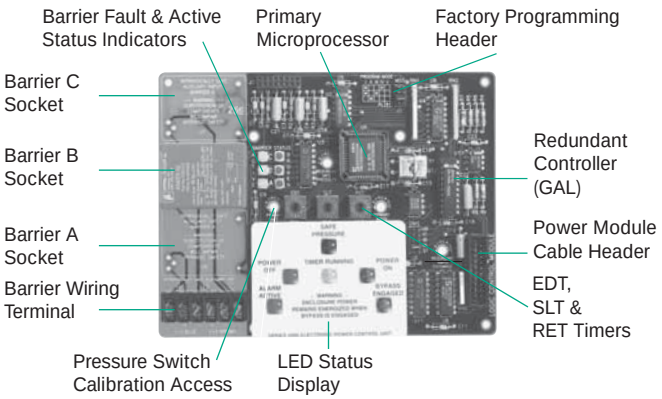
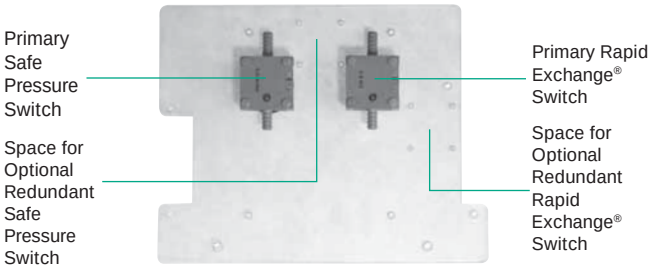
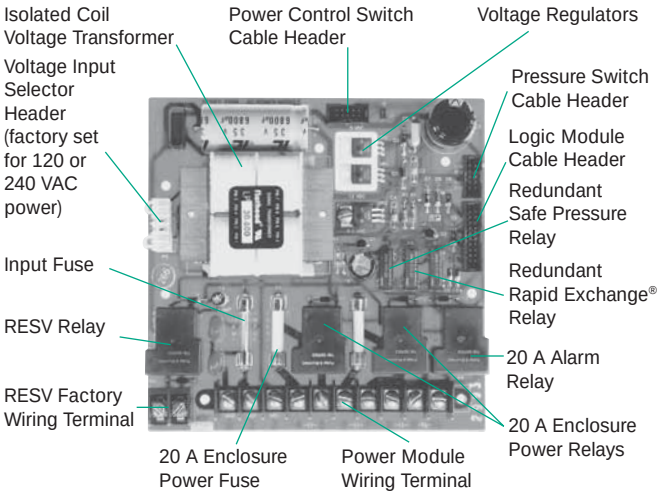
EPCU Logic Module



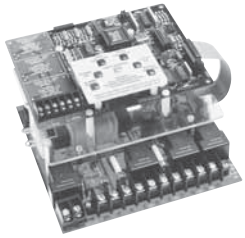
EPCU Pressure Switch Module



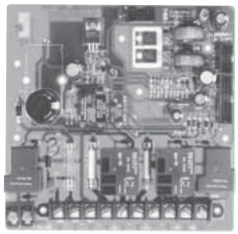
120/240 VAC EPCU Power Module



Assembled Electrical Power Control Unit



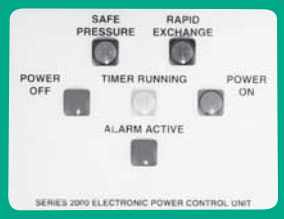
Optional 12-48 VDC EPCU Power Module



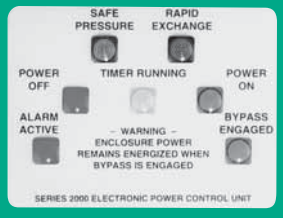
EPCU Features

LED DISPLAY INDICATORS

Power Off:	Enclosure Power Relays Deenergized
Power On:	Enclosure Power Relays Energized
Safe Pressure:	Enclosure Pressure > 0.15" w.c.
Rapid Exchange:	Enclosure Pressure > 2.0" w.c.
Timer Running:	Rapid Exchange® Timer Active
Alarm Active:	Enclosure Pressure < 0.15" w.c.
Bypass Engaged:	Control Bypass Active - CB



Alarm Only



Alarm & Bypass

FIELD ADJUSTABLE TIMER FUNCTIONS

EDT (Exchange Delay Timer) (FA Style only) provides a time delay to prevent Rapid Exchange® solenoid valve from energizing until safe pressure can be stabilized.

SLT (Solenoid Latching Timer) (FA Style only) provides a time delay to keep the Rapid Exchange® solenoid valve energized until exchange pressure is detected. If the pressure is not detected, the EPCU will reset.

RET (Rapid Exchange Timer) provides a time delay after Rapid Exchange® pressure is detected, to allow four volume exchanges prior to energizing the enclosure power relays. If safe pressure or Rapid Exchange® pressure is lost or interrupted during time delay cycle, the EPCU will reset.

Power Control Options

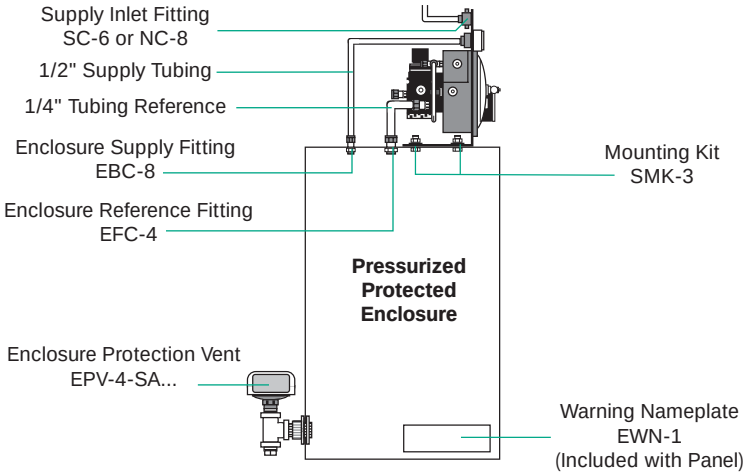
NORMAL RUNNING (NR) MODE

EPCU features an on-off push-button power control switch to activate control functions. Switch must be depressed to initiate start-up. After completion of start-up, safe pressure must be lost or switch must be depressed to deenergize enclosure power relays.

CONDITIONAL BYPASS (CB) MODE

EPCU features an off-on-bypass power control switch to activate control functions. Switch must be set to "on" position to initiate start-up. After enclosure power is energized, safe pressure must be lost or switch must be set to "off" position to deenergize enclosure power. After enclosure power is energized, switch may be set to "bypass" position to temporarily latch enclosure power relays. A flashing LED then indicates bypass engaged, and the enclosure can be accessed without deenergizing power (performed under specific conditions). Following access, safe pressure must be reestablished to resume normal operation. At that time, the switch may be reset to the "on" position without disruption of enclosure power. Alarm relay normally deenergizes only upon loss of safe pressure, but can be programmed to deenergize when bypass is engaged, if specified at time of order.

System Accessories Diagram



Model Number Designations

2004 - STD - CI - NR - LH - ##

Series Model Number

System Style
- **STD** - Standard
- **SA** - Semiautomatic
- **FA** - Fully Automatic

Area Classification
- **CI** - Class I, Group C & D Area
- **IB** - Class I, Group B Area (STD Only)

Power Control Mode
- **NR** - Normal Running
- **CB** - Conditional Bypass

Mounting Configuration

LH - left hand	left side of enclosure
RH - right hand	right side of enclosure
TM - top mount	top of enclosure
BM - bottom mount	bottom of enclosure
WM - wall mount	wall surface
FM* - frame mount	external frame or rack
PM* - panel mount	enclosure surface cutout

***** *FM & PM Configurations feature flush mount EPCU. Flush mount EPCU is not suitable for Group B Area.*

- See Accessories Page 118 for additional factory installed accessories

OPTIONAL INTRINSIC SAFETY BARRIERS
DESCRIPTION & OPERATION

The EPCU Logic Module can accommodate up to three intrinsic safety barriers to interact with remote devices and affect operation of the EPCU. The barriers are installed and programmed by the factory at time of order, and they are designed to function either in conjunction with a customer furnished switch and a Pepperl+Fuchs furnished resistor network cable, or a Pepperl+Fuchs furnished proximity detector. Each barrier develops a low power signal to create a two-wire closed-loop circuit. Operational status of each barrier is indicated by a green LED to show active (closed switch) status, and by a red LED to show faulted (line breakage) cable status. All barriers can be reprogrammed to duplicate other barrier functions as required, upon specific request.

BARRIER PROGRAMMING OPTIONS

Barrier A Function - when switch opens
Disables start-up cycle
Deenergizes enclosure power and alarm relay
Functions parallel to safe pressure switch

Barrier B Function - when switch opens
Not programmed - custom applications only

Barrier C Function - when switch closes
Energizes RESV relay - custom applications only

Model 2004 System Accessories *(See accessories page for complete details)*

CONNECTION FITTINGS

NC-8	1/2" Ninety Connector
SC-8	1/2" Straight Connector
EFC-4	1/4" Flush Connector
EFC-8	1/2" Flush Connector
EBC-8	1/2" Bulkhead Connector
EPC-14	1-1/2" Pipe Connector

ADDITIONAL ITEMS

SMK-2, -3 or -10	System Mounting Kit
RAH	Remote Alarm Horn
RAB-1	Div. 1 Remote Alarm Beacon
LCK	L Fitting Conduit Kit
TCK	T Fitting Conduit Kit
SRM-4000	Switch Resistor Module
NJ...	P+F Namur Sensor

INSTALLATION & OPERATION MANUAL

129-0213	Inst. & Operation Manual

ENCLOSURE PROTECTION VENTS
ONE VENT REQUIRED WITH EACH SYSTEM

EPV-4-SA-00	Straight w/Spark Arrestor
EPV-4-SA-90	Rt Angle w/Spark Arrestor

WARNING NAMEPLATES

EWN-1	Class I Enclosure Warning
ETW	Enclosure Temperature Warning

FACTORY INSTALLED ACCESSORIES

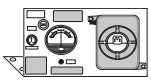
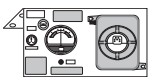
IS1	Channel A Barrier
IS2*	Channel B Barrier
IS3*	Channel C Barrier
RP1	Redundant Safe Pressure Switch
RP2	Redundant Rapid Exchange Switch
L	Power Switch Key Lock Assembly

*Requires custom programming information

ONE (1) ENCLOSURE WARNING NAMEPLATE & ONE (1) INSTALLATION & OPERATION MANUAL ARE PROVIDED WITH EACH SYSTEM

Overall System Dimensions



STD / SA & FA	LH - left hand	RH - right hand	TM - top mount	BM - bottom mount	WM - wall mount	FM or PM - flat panel
Height	24	24	14	14	24	26
Width	13.50	13.50	24	24	13.50	15.50
Depth	11.75 / 15.25	11.75 / 15.25	11.75 / 15.25	11.75 / 15.25	12.50 / 16.50	11.50 / 15.75

Dimensions in inches. Mounting dimensions available upon request. FM & PM panel cutout dimensions: 25h x 14.50w
Height & Width dimensions reflect mounting plate measurements. Depth dimension reflects overall measurement of system, including components.

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